



## General

### Guideline Title

Emergency nursing resource: difficult intravenous access.

### Bibliographic Source(s)

ENA Emergency Nursing Resources Development Committee. Emergency nursing resource: difficult intravenous access. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 15 p. [43 references]

### Guideline Status

This is the current release of the guideline.

## Recommendations

### Major Recommendations

The grades of recommendations (A–C, Not Recommended), levels of evidence (I–VII), and quality of evidence (I–IV) are defined at the end of the "Major Recommendations" field.

#### Description of Decision Options/Interventions and the Level of Recommendation

Conclusions and recommendations about alternatives to venous access in the patient with difficult intravenous (IV) access in the emergency department (ED):

1. Ultrasound-Guided Intravenous Access
  - i. Ultrasound-guided IV access is a viable option for patients with known difficult access for both adult and pediatric populations. Level A – High.
  - ii. Ultrasound-guided IV access is a technique that can effectively be performed by physicians, nurses and ED technicians. Level A – High.
  - iii. Ultrasound-guided techniques may result in improved patient satisfaction. Level C – Weak.
  - iv. When the external jugular vein is not visible, ultrasound-guided peripheral access is significantly more successful than external jugular access. Level C – Weak.
2. Intraosseous Vascular Access
  - i. Intraosseous venous access is significantly more expeditious than standard IV access and should be considered early when known or suspected difficult IV access exists. Level A – High.
  - ii. In alert patients, pain with intraosseous insertion is rated as minor. Level A – High.
  - iii. Lidocaine administration prior to medication infusion reduces the pain felt by alert patients. Level C – Weak.

### 3. Subcutaneous Rehydration Therapy (SCRT)

- i. SCRT is an alternative to peripheral IV insertion for the mildly to moderately dehydrated pediatric and elderly patients. Level B – Moderate.

### 4. Warming

- i. Application of heat improves IV success rate and decreases time required to gain access. Level B – Moderate.
  - a. Dry heat may be more effective than moist heat. Level C – Weak
- ii. For pediatric patients, heat may counteract the vasoconstriction associated with EMLA Cream™. Level C – Weak.

### 5. Alternative Methods

- i. The use of infrared light, transillumination, and the Vein Entry Indicator Device (VEID<sup>trade</sup>) may be beneficial for pediatric patients with difficult IV access, dehydration or a chronic illness. Level C – Weak.

## Definitions:

### Levels of Recommendation for Practice

#### Level A Recommendations: High

- Reflects a high degree of clinical certainty
- Based on availability of high quality Level I, II and/or III evidence available using Melnyk & Fineout-Overholt grading system\* (see the "Rating Scheme for the Strength of the Evidence" field)
- Based on consistent and good quality evidence; has relevance and applicability to emergency nursing practice
- Is beneficial

#### Level B Recommendations: Moderate

- Reflects moderate clinical certainty
- Based on availability of Level III and/or Level IV and V evidence using Melnyk & Fineout-Overholt grading system\* (see the "Rating Scheme for the Strength of the Evidence" field)
- There are some minor flaws or inconsistencies in quality of evidence; has relevance and applicability to emergency nursing practice
- Is likely to be beneficial

#### Level C Recommendations: Weak

- Level V, VI and/or VII evidence available using Melnyk & Fineout-Overholt grading system\* (see the "Rating Scheme for the Strength of the Evidence" field) - Based on consensus, usual practice, evidence, case series for studies of treatment or screening, anecdotal evidence, and/or opinion
- There is limited or low quality patient-oriented evidence; has relevance and applicability to emergency nursing practice
- Has limited or unknown effectiveness

#### Not Recommended for Practice

- No objective evidence or only anecdotal evidence available; or the supportive evidence is from poorly controlled or uncontrolled studies
- Other indications for not recommending evidence for practice may include:
  - Conflicting evidence
  - Harmfulness has been demonstrated
  - Cost or burden necessary for intervention exceeds anticipated benefit
  - Does not have relevance or applicability to emergency nursing practice
- There are certain circumstances in which the recommendations stemming from a body of evidence should not be rated as highly as the individual studies on which they are based. For example:
  - Heterogeneity of results
  - Uncertainty about effect magnitude and consequences
  - Strength of prior beliefs
  - Publication bias

## Grading the Levels of Evidence\*

- I. Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials or evidence-based clinical practice guidelines based on systematic reviews of randomized controlled trials (RCTs)
- II. Evidence obtained from at least one properly designed randomized controlled trial
- III. Evidence obtained from well-designed controlled trials without randomization
- IV. Evidence obtained from well-designed case control and cohort studies
- V. Evidence from systematic reviews of descriptive and qualitative studies
- VI. Evidence from a single descriptive or qualitative study
- VII. Evidence from opinion of authorities and/or reports of expert committees

## Grading the Quality of the Evidence

- I. Acceptable Quality: No Concerns
- II. Limitations in Quality: Minor flaws or inconsistencies in the evidence
- III. Major Limitations in Quality: Many flaws and inconsistencies in the evidence
- IV. Not Acceptable: Major flaws in the evidence

\*Melnik, B. M., & Fineout-Overholt, E. (2005). Evidence-based practice in nursing and healthcare: A guide to best practice. Philadelphia, PA: Lippincott, Williams, & Wilkins.

## Clinical Algorithm(s)

None provided

## Scope

## Disease/Condition(s)

Conditions that require intravenous access

## Guideline Category

Management

Technology Assessment

## Clinical Specialty

Emergency Medicine

Nursing

## Intended Users

Advanced Practice Nurses

Nurses

Physicians

## Guideline Objective(s)

To evaluate, in emergency department (ED) patients with known or suspected difficult intravenous (IV) access, whether warming, intraosseous, ultrasound-guided, subcutaneous rehydration therapy or infrared methods compared to traditional techniques improves IV access with fewer attempts, less pain, and/or improved patient satisfaction while in the ED

## Target Population

Patients with known or suspected difficult intravenous access in the emergency department

## Interventions and Practices Considered

1. Ultrasound-guided intravenous (IV) access
2. Intraosseous vascular access
3. Lidocaine administration prior to medication infusion
4. Subcutaneous rehydration therapy
5. Warming
6. Alternative methods (infrared light, transillumination, and the Vein Entry Indicator Device [VEID™])

## Major Outcomes Considered

- Venous cannulation success rates
- First attempt success rates
- Number of cannulation attempts
- Time to achieve intravenous insertion
- Patient satisfaction

## Methodology

### Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

Via a comprehensive literature search, all articles relevant to the topic were identified. The following databases were searched: PubMed, Google Scholar, CINAHL, Cochrane - British Medical Journal, Agency for Healthcare Research and Quality (AHRQ; [www.ahrq.gov](http://www.ahrq.gov) ) , and the National Guideline Clearinghouse ([www.guideline.gov](http://www.guideline.gov) ). Searches were conducted using the search terms "difficult intravenous access," "tools intravenous access," "heat," "nitroglycerin," "tourniquet," "ultrasound," "light," "illumination," "subcutaneous rehydration therapy," and "hypodermoclysis," using a variety of different search combinations. Searches were limited to English language articles on human subjects from January 2003 to October 2011. In addition, the reference lists in the selected articles were scanned for pertinent research articles. Research articles from emergency department (ED) settings, non-ED settings, position statements and guidelines from other sources were also included in the review.

Articles that met the following criteria were chosen to formulate the Emergency Nursing Resource (ENR): research studies, meta-analyses, systematic reviews, and existing guidelines relevant to the topic of difficult intravenous (IV) access. Other types of reference articles and textbooks were also reviewed and used to provide additional information.

## Number of Source Documents

19 documents were included in the evidence tables.

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

Grading the Levels of Evidence\*

- I. Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs) or evidence-based clinical practice guidelines based on systematic reviews of RCTs
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Grading the Quality of the Evidence

- I. Acceptable Quality: No concerns
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- IV. Not Acceptable: Major flaws in the evidence

\*Melnik, B. M., & Fineout-Overholt, E. (2005). Evidence-based practice in nursing and healthcare: A guide to best practice. Philadelphia, PA: Lippincott, Williams, & Wilkins.

## Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

## Description of the Methods Used to Analyze the Evidence

The Emergency Nursing Resource (ENR) authors used standardized worksheets, including the Reference Table, Evidence-Appraisal Table, Critique Worksheet and Appraisal of Guidelines Research and Evaluation (AGREE) Work Sheet (see the methodology companion in the "Availability of Companion Documents" field), to prepare tables of evidence ranking each article in terms of the level of evidence, quality of evidence, and relevance and applicability to practice. Clinical findings and levels of recommendations regarding patient management were then made by the Emergency Nursing Resource Development Committee according to the Emergency Nurses Association's (ENA's) classification of levels of recommendation for practice, which include: Level A High, Level B Moderate, Level C Weak, or Not recommended for practice (see the "Rating Scheme for the Strength of the Recommendations" field).

## Methods Used to Formulate the Recommendations

Expert Consensus

## Description of Methods Used to Formulate the Recommendations

All members of the Subcommittee independently complete an exhaustive review of all identified literature, complete a separate evidence table for

each topic (if possible), and then reconvene to reach consensus. Each Subcommittee prepares a description of the topic, definition, background, significance, and evidence table. The Subcommittee identifies and assigns preliminary scores for quality and strength of evidence, and describes conclusions based on the review of the body of evidence. The entire Committee reads the articles and reviews the evidence-appraisal tables for each topic and then finalizes implications for practice and the level of recommendation.

## Rating Scheme for the Strength of the Recommendations

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## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

Internal Peer Review

## Description of Method of Guideline Validation

The Institute for Emergency Nursing Research (IENR) Advisory Council reviews the final document for overall validity and provides feedback as appropriate using the Emergency Nursing Resource (ENR) Evaluation Worksheet. Reviews and feedback are sent to the subgroup to evaluate and incorporate, as appropriate. Emergency Nurses Association (ENA) staff creates the final products for publication with input from the Committee.

## Evidence Supporting the Recommendations

### Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is specifically stated for each recommendation (see the "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

Appropriate management of difficult intravenous access resulting in fewer attempts, less pain, and/or improved patient satisfaction while in the emergency department

### Potential Harms

- Adverse events related to establishing intravenous access
- Caution must be used with warming technique as burning may occur if not closely monitored and controlled. The U.S. Food and Drug Administration (FDA) issued a patient safety warning in 2002 against the practice of using forced air warmers without the blanket in a practice known as "hosing" because second and third degree burns have resulted.

## Contraindications

### Contraindications

Contraindications are specific to each type of access.

## Qualifying Statements

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- Emergency Nurses Association's (ENA's) Emergency Nursing Resources (ENRs) are developed by ENA members to provide emergency nurses with evidence-based information to utilize and implement in their care of emergency patients and families. Each ENR focuses on a clinical or practice-based issue, and is the result of a review and analysis of current information believed to be reliable. As such, information

and recommendations within a particular ENR reflect the current scientific and clinical knowledge at the time of publication, are only current as of their publication date, and are subject to change without notice as advances emerge.

- In addition, variations in practice, which take into account the needs of the individual patient and the resources and limitations unique to the institution, may warrant approaches, treatments and/or procedures that differ from the recommendations outlined in the ENRs. Therefore, these recommendations should not be construed as dictating an exclusive course of management, treatment or care, nor does the use of such recommendations guarantee a particular outcome. ENRs are never intended to replace a practitioner's best medical judgment based on the clinical circumstances of a particular patient or patient population. ENRs are published by ENA for educational and informational purposes only, and ENA does not approve or endorse any specific methods, practices, or sources of information. ENA assumes no liability for any injury and/or damage to persons or property arising out of or related to the use of or reliance on any ENR.

## Implementation of the Guideline

### Description of Implementation Strategy

An implementation strategy was not provided.

### Implementation Tools

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

## Institute of Medicine (IOM) National Healthcare Quality Report Categories

### IOM Care Need

Getting Better

### IOM Domain

Effectiveness

Patient-centeredness

Timeliness

## Identifying Information and Availability

### Bibliographic Source(s)

ENA Emergency Nursing Resources Development Committee. Emergency nursing resource: difficult intravenous access. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 15 p. [43 references]

### Adaptation



Not applicable: The guideline was not adapted from another source.

## Date Released

2011 Dec

## Guideline Developer(s)

Emergency Nurses Association - Professional Association

## Source(s) of Funding

Emergency Nurses Association

## Guideline Committee

2011 ENA Emergency Nursing Resources Development Committee

## Composition of Group That Authored the Guideline

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## Financial Disclosures/Conflicts of Interest

Not stated

## Guideline Status

This is the current release of the guideline.

## Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the [Emergency Nurses Association Web site](#) .

## Availability of Companion Documents

The following are available:

- ENA Clinical Guidelines for Emergency Nursing Practice Committee. Guidelines for the development of clinical practice guidelines. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 30 p. Electronic copies: Available in Portable Document Format (PDF) from the [Emergency Nurses Association Web site](#) .
- Clinical practice guideline: difficult intravenous access. Synopsis. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 1 p. Electronic copies: Available in PDF from the [Emergency Nurses Association Web site](#) .
- CPG evidence table: difficult intravenous access. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 17 p. Electronic copies: Available in PDF from the [Emergency Nurses Association Web site](#) .
- CPG other resources table: Difficult intravenous access. Des Plaines (IL): Emergency Nurses Association; 2011 Dec. 4 p. Electronic

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI Institute on July 2, 2012. The information was verified by the guideline developer on August 13, 2012.

## Copyright Statement

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